

REPORT NUMBER: 301-MGA-2009-001

**SAFETY COMPLIANCE TESTING FOR FMVSS 301R
FUEL SYSTEM INTEGRITY – REAR IMPACT**

**DAIMLER CHRYSLER AG
2008 DODGE SPRINTER 2500 CARGO VAN
NHTSA NUMBER: C80306**

**PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105**



Test Date: April 14, 2009

Final Report Date: April 22, 2009

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVENUE, S.E., NVS-220
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-06-C-00030.

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: Joe Fleck Date: 4/16/09
Joe Fleck, Project Engineer

Reviewed by: David Winkelbauer Date: 4/16/09
David Winkelbauer, Facility Director

FINAL REPORT ACCEPTED BY:

Edward E. Chan

Digitally signed by Edward E. Chan
DN: CN = Edward E. Chan, C = US, O =
National Highway Traffic Safety Administration,
OU = Office of Vehicle Safety Compliance
Date: 2009.04.22 09:31:38 -0400

COTR, Rear Impact

4/22/2009
Date of Acceptance

Technical Report Documentation Page

1. Report No. 301-MGA-2009-001	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report for Fuel System Integrity Test of a 2008 Dodge Sprinter 2500 Cargo Van NHTSA No.: C80306		5. Report Date April 16, 2009	
		6. Performing Organization Code MGA	
7. Author(s) Joe Fleck, Project Engineer		8. Performing Organization Report No. 301-MGA-2009-001	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.	
		11. Contract or Grant No. DTNH22-06-C-00030	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement, Office of Vehicle Safety Compliance 1200 New Jersey Avenue, S.E., NVS-220 Washington, D.C. 20590		13. Type of Report and Period Covered Final Report 4/14/2009 – 4/22/2009	
		14. Sponsoring Agency Code NVS-220	
15. Supplementary Notes			
16. Abstract A rear impact was conducted on a 2008 Dodge Sprinter 2500 Cargo Van at MGA Research Corporation on April 14, 2009. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 79.5 km/h. The ambient temperature at the time of impact was 4.4 degrees Celsius.			
17. Key Words Fuel System Integrity Test 2008 Dodge Sprinter 2500 Cargo Van NHTSA No: C80306		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin., Technical Ref. Division, 1200 New Jersey Avenue, SE Washington, D.C. 20590	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 58	22. Price

TABLE OF CONTENTS

<u>Section</u>		<u>Page No</u>
1	Purpose and Summary of Test	1
2	Data Sheets	2
<u>Data Sheet No.</u>		<u>Page No.</u>
1	Test Vehicle Specifications	2
2	Pre-Test Data	4
3	Moving Barrier Data	6
4	Post-Test Data	7
5	Static Rollover Test Data	8
<u>Form No.</u>		
1	Test Vehicle Information	10
<u>Appendix</u>		
A	Photographs	A

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This rear impact test is sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-C-00030. The purpose of this test is to reduce deaths and injuries occurring from fires that result from fuel spillage during and after motor vehicle crashes and resulting from ingestion of fuels during siphoning.

SUMMARY

A 2008 Dodge Sprinter 2500 Cargo Van was impacted by a Moving Deformable Barrier (MDB) at a velocity of 79.5 km/h. The test was performed at MGA Research Corporation on April 14, 2009. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and four high-speed cameras were used to document the impact event.

- Left Rear Half 1000 fps
- Right Rear Half 1000 fps
- Overhead Overall 1000 fps
- Right Overall 1000 fps
- Real Time Pan 24 fps

Two ballast Part 572E, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

SECTION 2
DATA SHEETS

DATA SHEET NO. 1
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2008 Dodge Sprinter 2500 Cargo Van NHTSA No.: C80306
Test Program: FMVSS 301 Fuel System Integrity Test Date: 4/14/2009

TEST VEHICLE INFORMATION

Manufacturer	Daimler Chrysler AG
Model	Dodge Sprinter
Body Style	Cargo Van
Major Options	Adaptive Electronic Stability
NHTSA No.	C80306
VIN	WDOPE745185254983
Color	Arctic White
Delivery Date	3/26/2009
Odometer Reading (mile)	679
Dealer	Genesee Valley Chrysler, Dodge, Jeep
Transmission	Automatic
Final Drive	Rear Wheel Drive
Number of Cylinders	6
Engine Displacement (L)	3.0
Engine Placement	Longitudinal

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Daimler Chrysler AG
Date of Manufacture	11/07

GVWR (kg)	3878
GAWR Front (kg)	1801
GAWR Rear (kg)	2431

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket/Bench			
Number of Occupants	3			3
Capacity Wt. (VCW) (kg)				1523
Number of Occupants x 68 kg.				204
Cargo Wt. (RCLW) (kg)				1319

DATA SHEET NO. 1 (continued)
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2008 Dodge Sprinter 2500 Cargo Van NHTSA No.: C80306
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 4/14/2009

DATA FROM VEHICLE'S TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	550	550
Cold Pressure (kPa)	320	480
Recommended Tire Size	LT245/75R16	LT245/75R16
Recommended Load Range	120/116 Q	120/116 Q
Tire Size on Vehicle	LT 245/75 R16	LT 245/75 R16
Tire Manufacturer	Continental	Continental
Location of Placard of Vehicle	Driver's B-Post Door Frame	
Type of Spare Tire (full size/space saver)	Full Size	

DATA SHEET NO. 2**PRE-TEST DATA**

Test Vehicle: 2008 Dodge Sprinter 2500 Cargo Van
 Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80306
 Test Date: 4/14/2009

WEIGHT OF TEST VEHICLE

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	682.7	494.0		730.7	580.2	
Right	kg	668.2	502.1		723.5	589.7	
Ratio	%	57.6	42.4		55.4	44.6	
Totals	kg	1350.9	996.1	2347.0	1454.2	1169.9	2624.1

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2347.0
Rated Cargo/Luggage Weight (RCLW)	kg	136
Weight of 2 P572E ATDs	kg	148
Calculated Vehicle Target Weight (TVTWT)	kg	2631

Vehicle Wheelbase	3665
Vehicle Width	2022
Weight of Ballast secured in cargo floor	131.5 kg
Method of Securing Ballast	Bolts
Vehicle Components Removed for Weight Reduction	None

VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	868	869	903	902
As Tested	mm	869	866	896	896

DATA SHEET NO. 2 (continued)**PRE-TEST DATA**Test Vehicle: 2008 Dodge Sprinter 2500 Cargo VanNHTSA No.: C80306Test Program: FMVSS 301 Fuel System IntegrityTest Date: 4/14/2009**FUEL SYSTEM DATA**

	Units: Liters
Usable Capacity of "Standard Tank" (Owner's Manual)	99.9
Usable Capacity Figure Furnished by COTR	99.9
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	92.0 to 93.9
Actual Test Volume (entire fuel system filled)	93.1

Test Fluid Type	Stoddard Solvent
Test Fluid Kinematic Viscosity (centistokes)	2.1 cSt @ 20° C
Test Fluid Color	Purple
Type of Vehicle Fuel Pump	Electrical
Activate Electric Fuel Pump Operation with Ignition Switch ON, but Engine OFF	Yes

Comments (noticeable attributes of fuel system components, capacity, etc.)	None
--	------

DATA SHEET NO. 3
MOVING BARRIER DATA

Test Vehicle: 2008 Dodge Sprinter 2500 Cargo Van NHTSA No.: C80306
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 4/14/2009

MOVING BARRIER'S TEST WEIGHT

	Units	Front	Rear	Total
Left	kg	374.2	308.8	
Right	kg	389.5	291.2	
Ratio	%	56.0	44.0	
Totals	kg	763.7	600.0	1363.7

Tires (Mfr, line, size)	Yokohama
Tire Pressure (kPa)	207
Brake Abort System (Yes/No)?	Yes
Date of Last Calibration	8/6/2008

DATA SHEET NO. 4**POST-TEST DATA**Test Vehicle: 2008 Dodge Sprinter 2500 Cargo VanNHTSA No.: C80306Test Program: FMVSS 301 Fuel System IntegrityTest Date: 4/14/2009**IMPACT VELOCITY**

	Units: km/h
Required Impact Velocity	80.0
Actual Impact Velocity (Trap No. 1)	79.5
Actual Impact Velocity (Trap No. 2)	79.5
Average Impact Speed	79.5

Temperature at Time of Impact (°C)	4.4
Test Time	9:47 am

WELDING ROD IMPACT POINT

	Units: mm
Vertical distance from target center (+ above target / - below target)	4 mm down
Horizontal distance from target center (+ to the right / - to the left)	20 mm to the left

DATA SHEET NO. 5 **STATIC ROLLOVER TEST DATA**

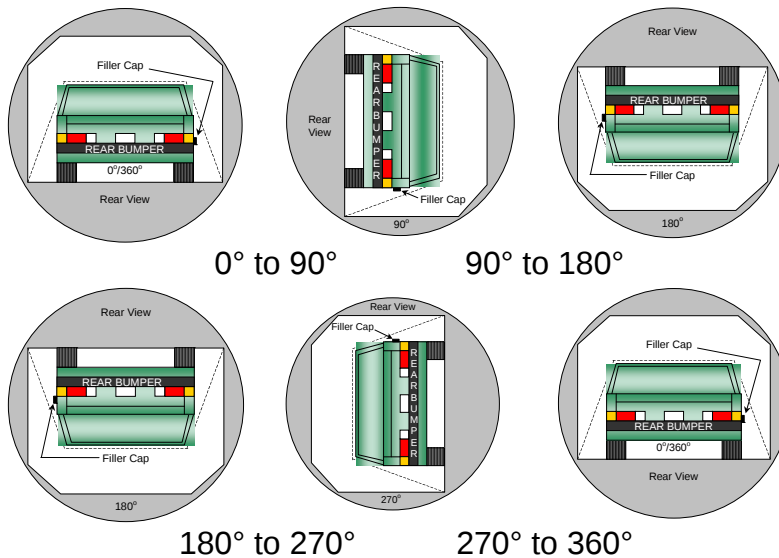
Test Vehicle: 2008 Dodge Sprinter 2500 Cargo Van
 Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80306
 Test Date: 4/14/2009

STODDARD SOLVENT SPILLAGE MEASUREMENT

- A. From impact until vehicle motion ceases: 0 g
 (Maximum Allowable = 28 grams)
- B. For the 5 minute period after motion ceases: 0 g
 (Maximum Allowable = 28 grams)
- C. For the following 25 minutes: 0 g
 (Maximum Allowable = 28 grams/minute)
- D. Spillage: None

FMVSS 301 STATIC ROLLOVER DATA



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations: **Not Applicable**

DATA SHEET NO. 5 (continued)

STATIC ROLLOVER TEST DATA

Test Vehicle: 2008 Dodge Sprinter 2500 Cargo Van
 Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80306
 Test Date: 4/14/2009

STODDARD SOLVENT SPILLAGE MEASUREMENT

Hold Time = 5 minutes at all intervals

0° TO 90° Rotation Time (sec) = 160 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

90° TO 180° Rotation Time (sec) = 160 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

180° TO 270° Rotation Time (sec) = 145 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

270° TO 360° Rotation Time (sec) = 153 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

FORM 1
TEST VEHICLE INFORMATION

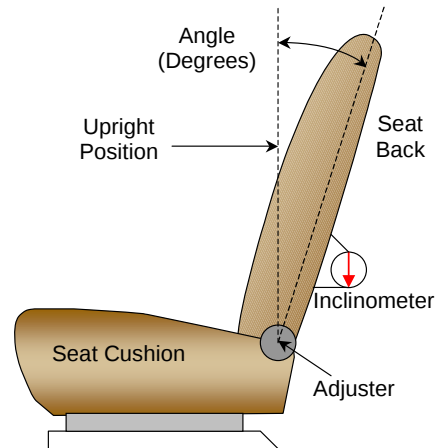
Test Vehicle: 2008 Dodge Sprinter 2500 Cargo Van
Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80306
Test Date: 4/14/2009

NORMAL DESIGN RIDING POSITION

With the seat in the mid fore-aft seat track position the angle of the driver's seat back when it is in the nominal riding position is 10.0°.

Driver Seat Back Angle	10.0°
Passenger Seat Back Angle	Fixed



FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	38 detents	19 th detent, 1 st as 0
Passenger Seat	Fixed	Fixed

D-RING ADJUSTMENT

The driver and passenger D-rings were full up.

STEERING COLUMN ADJUSTMENT

The steering column was placed in the mid position.

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Page No.

Photo No. 1.	Vehicle's Certification Label	A-1
Photo No. 2.	Vehicle's Tire Placard	A-2
Photo No. 3.	Pre-Test Front View of Vehicle	A-3
Photo No. 4.	Post-Test Front View of Vehicle	A-4
Photo No. 5.	Pre-Test Left Side View of Vehicle	A-5
Photo No. 6.	Pre-Test Left Rear Closeup View of Vehicle	A-6
Photo No. 7.	Post-Test Left Rear Closeup View of Vehicle	A-7
Photo No. 8.	Pre-Test Right Side View of Vehicle	A-8
Photo No. 9.	Post-Test Right Side View of Vehicle	A-9
Photo No. 10.	Pre-Test Right Rear Closeup View of Vehicle	A-10
Photo No. 11.	Post-Test Right Rear Closeup View of Vehicle	A-11
Photo No. 12.	Pre-Test Rear View of Vehicle	A-12
Photo No. 13.	Post-Test Rear View of Vehicle	A-13
Photo No. 14.	Pre-Test $\frac{3}{4}$ Frontal View From Right Side of Vehicle	A-14
Photo No. 15.	Post-Test $\frac{3}{4}$ Frontal View From Right Side of Vehicle	A-15
Photo No. 16.	Pre-Test $\frac{3}{4}$ Rear View From Right Side of Vehicle	A-16
Photo No. 17.	Post-Test $\frac{3}{4}$ Rear View From Right Side of Vehicle	A-17
Photo No. 18.	Pre-Test $\frac{3}{4}$ Rear View From Left Side of Vehicle	A-18
Photo No. 19.	Post-Test $\frac{3}{4}$ Rear View From Left Side of Vehicle	A-19
Photo No. 20.	Pre-Test Impact Point	A-20
Photo No. 21.	Post-Test Impact Point	A-21
Photo No. 22.	Pre-Test Underbody View 1	A-22
Photo No. 23.	Post-Test Underbody View 1	A-23
Photo No. 24.	Pre-Test Underbody View 2	A-24
Photo No. 25.	Post-Test Underbody View 2	A-25
Photo No. 26.	Pre-Test Underbody View 3	A-26
Photo No. 27.	Post-Test Underbody View 3	A-27

Page No.

Photo No. 28.	Pre-Test Underbody View 4	A-28
Photo No. 29.	Post-Test Underbody View 4	A-29
Photo No. 30.	Pre-Test Front View of MDB	A-30
Photo No. 31.	Post-Test Front View of MDB	A-31
Photo No. 32.	Pre-Test $\frac{3}{4}$ Right Side View of MDB	A-32
Photo No. 33.	Post-Test $\frac{3}{4}$ Right Side View of MDB	A-33
Photo No. 34.	Pre-Test $\frac{3}{4}$ Left Side View of MDB	A-34
Photo No. 35.	Post-Test $\frac{3}{4}$ Left Side View of MDB	A-35
Photo No. 36.	Pre-Test Top View of MDB	A-36
Photo No. 37.	Post-Test Top View of MDB	A-37
Photo No. 38.	Static Rollover at 90 Degrees	A-38
Photo No. 39.	Static Rollover at 180 Degrees	A-39
Photo No. 40.	Static Rollover at 270 Degrees	A-40
Photo No. 41.	Static Rollover at 360 Degrees	A-41

MFD: DAIMLERCHRYSLER AG

VIN WDOPE745185254983

GVWR

3878 / 8550 KG/LB

GCWR

6146 / 13550 KG/LB

GAWR FRONT

1801 / 3970 KG/LB

GAWR REAR

2431 / 5360 KG/LB

TYPE

TRUCK

DATE OF MFD

11/2007





TIRE AND LOADING INFORMATION

SEATING CAPACITY - TOTAL **3** FRONT **3** REAR **0**

THE COMBINED WEIGHT OF OCCUPANTS AND CARGO SHOULD NEVER EXCEED **1523 KG OR 3359 LBS.**

TIRE	FRONT	REAR	SPARE
ORIGINAL TIRE SIZE	LT 245/75 R16	LT 245/75 R16	LT 245/75 R16
COLD TIRE INFLATION PRESSURE	320kPa/47PSI	480kPa/70PSI	480kPa/70PSI

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION ⓘ

A 901 584 00 15

Vehicle's Tire Placard



Pre-Test Front View of Vehicle



Post-Test Front View of Vehicle

A-5.



Pre-Test Left Side View of Vehicle



Pre-Test Left Rear Close-up View of Vehicle



Post-Test Left Rear Close-up View of Vehicle

A-8.



Pre-Test Right Side View of Vehicle

A-9.



Post-Test Right Side View of Vehicle



Pre-Test Right Rear Close-up View of Vehicle



Post-Test Right Rear Close-up View of Vehicle



Pre-Test Rear View of Vehicle



Post-Test Rear View of Vehicle



Pre-Test ¾ Frontal View From Right Side of Vehicle



Post-Test ¾ Frontal View From Right Side of Vehicle



Pre-Test ¾ Rear View From Right Side of Vehicle



Post-Test $\frac{3}{4}$ Rear View From Right Side of Vehicle



Pre-Test $\frac{3}{4}$ Rear View From Left Side of Vehicle



Post-Test ¾ Rear View From Left Side of Vehicle

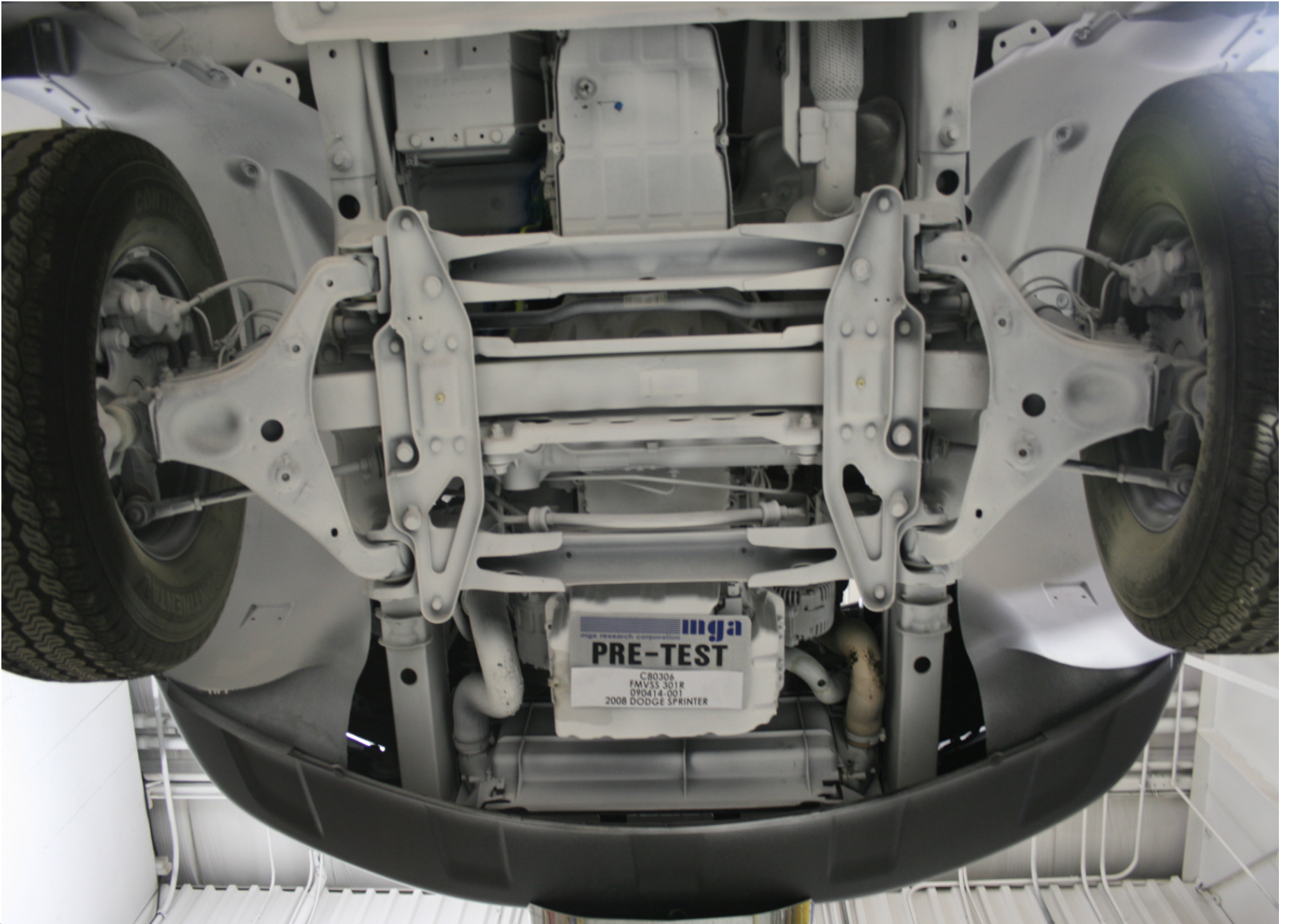


Pre-Test Impact Point

A-21.

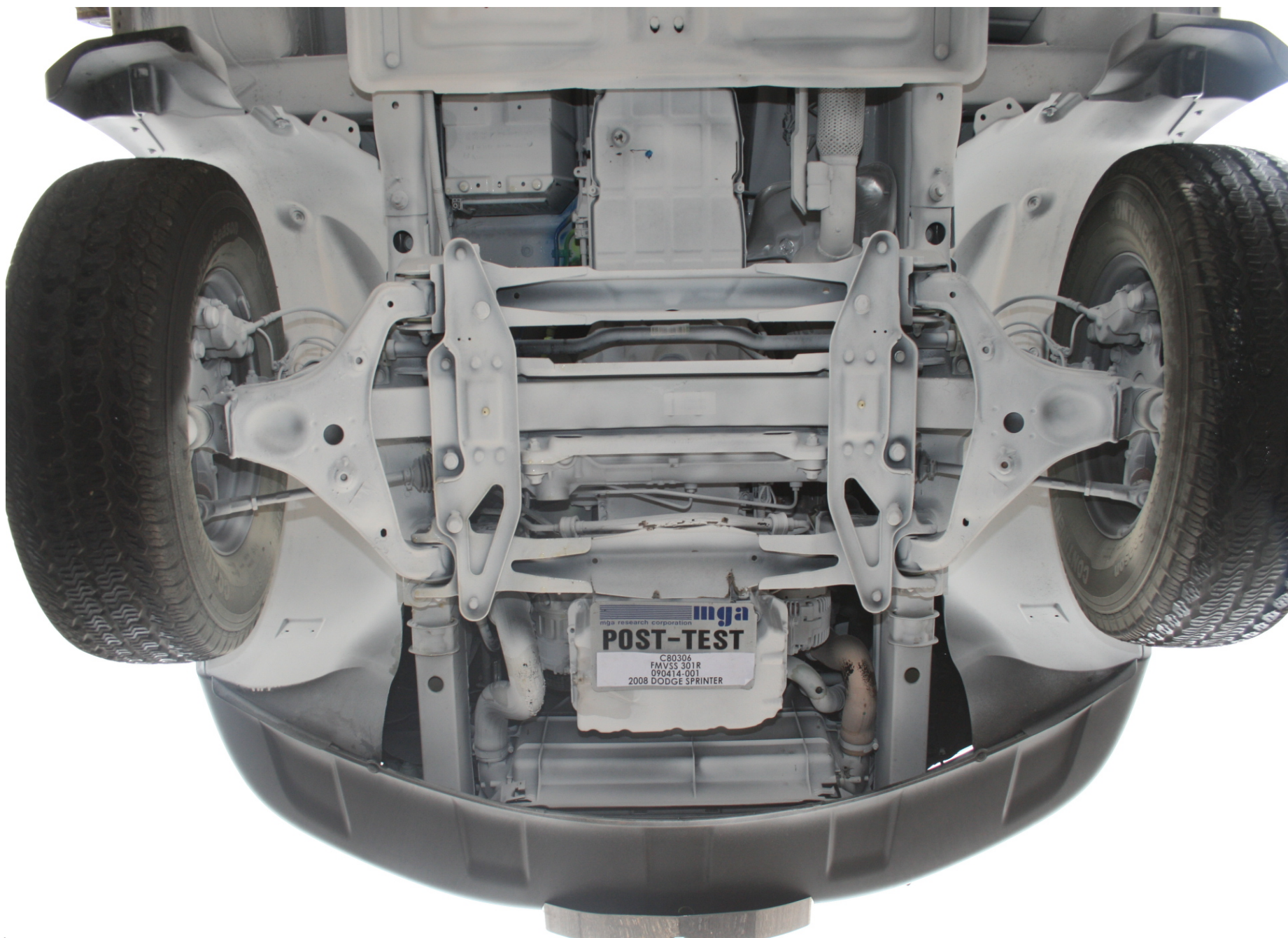


Post-Test Impact Point



A-22.

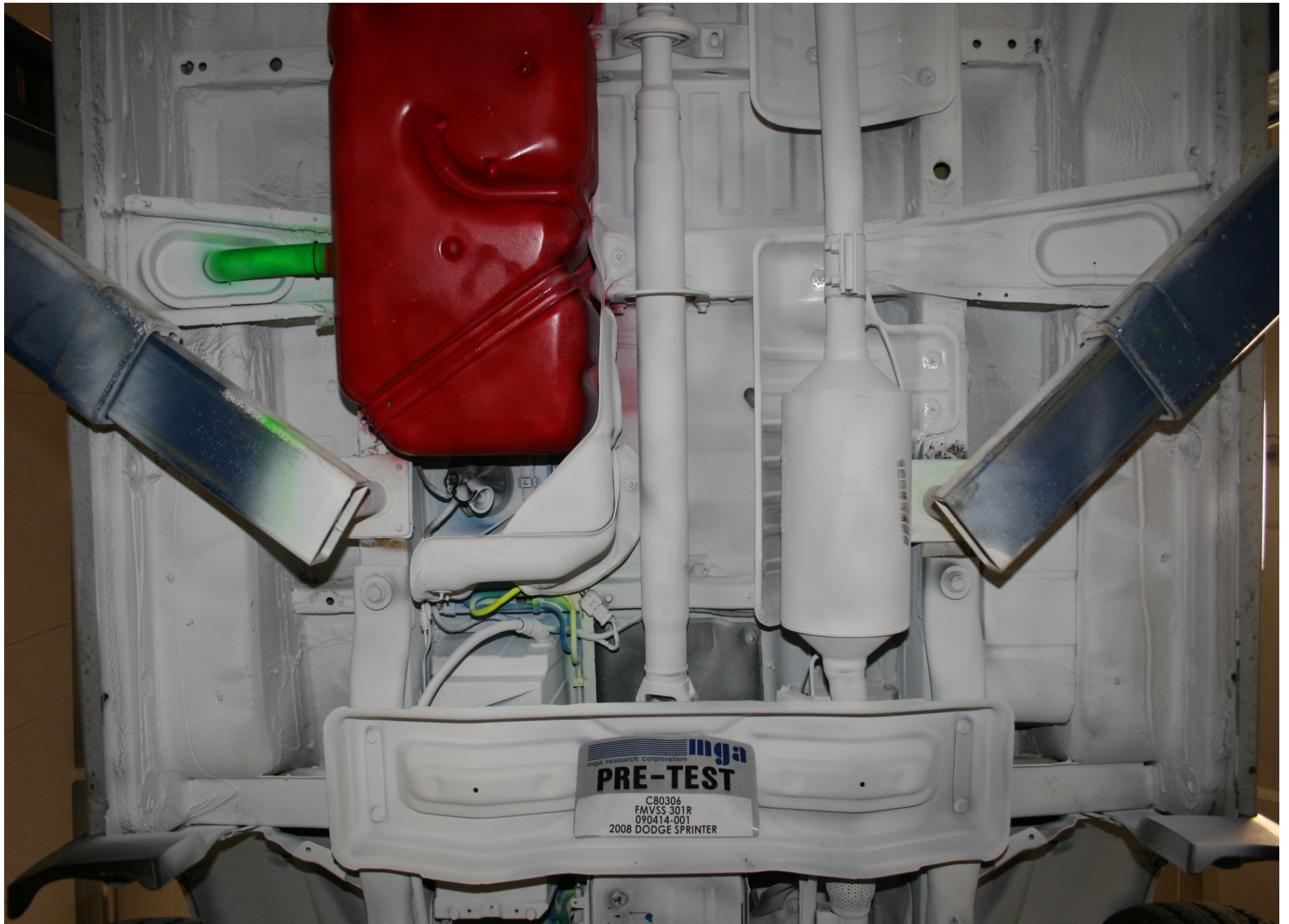
Pre-Test Underbody View 1



A-23.

Post-Test Underbody View 1

A-24.



Pre-Test Underbody View 2

A-25.



Post-Test Underbody View 2



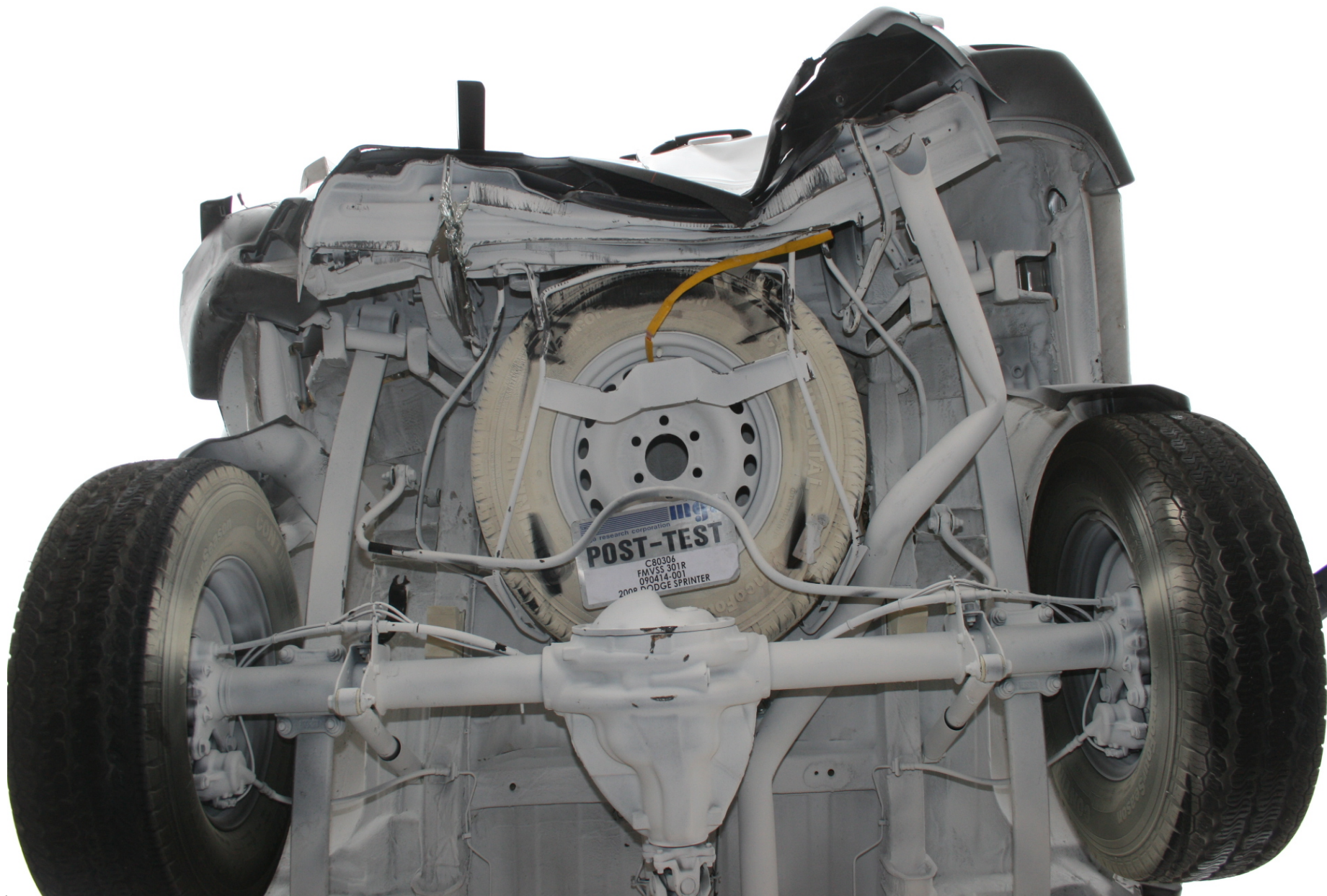
Pre-Test Underbody View 3



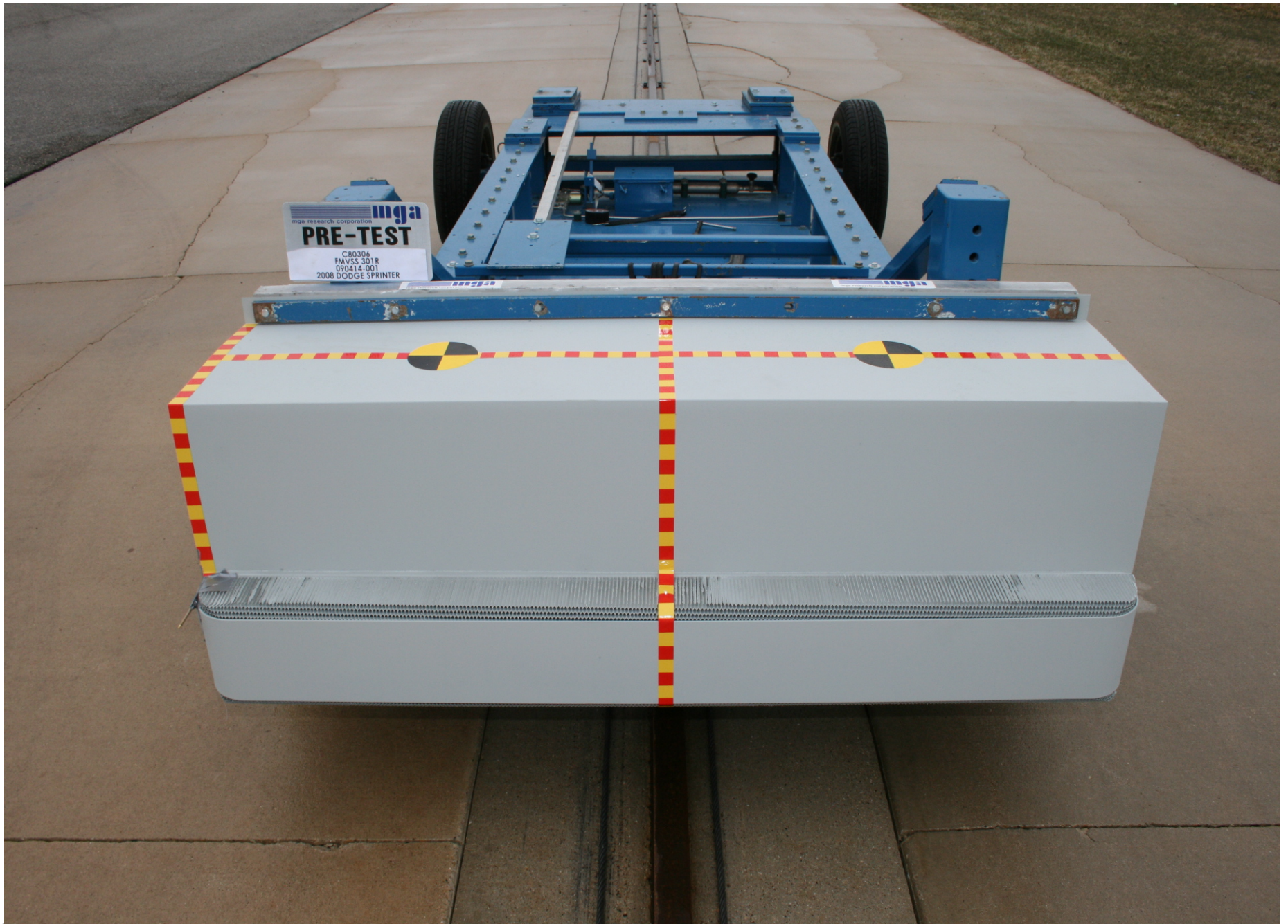
Post-Test Underbody View 3



Pre-Test Underbody View 4



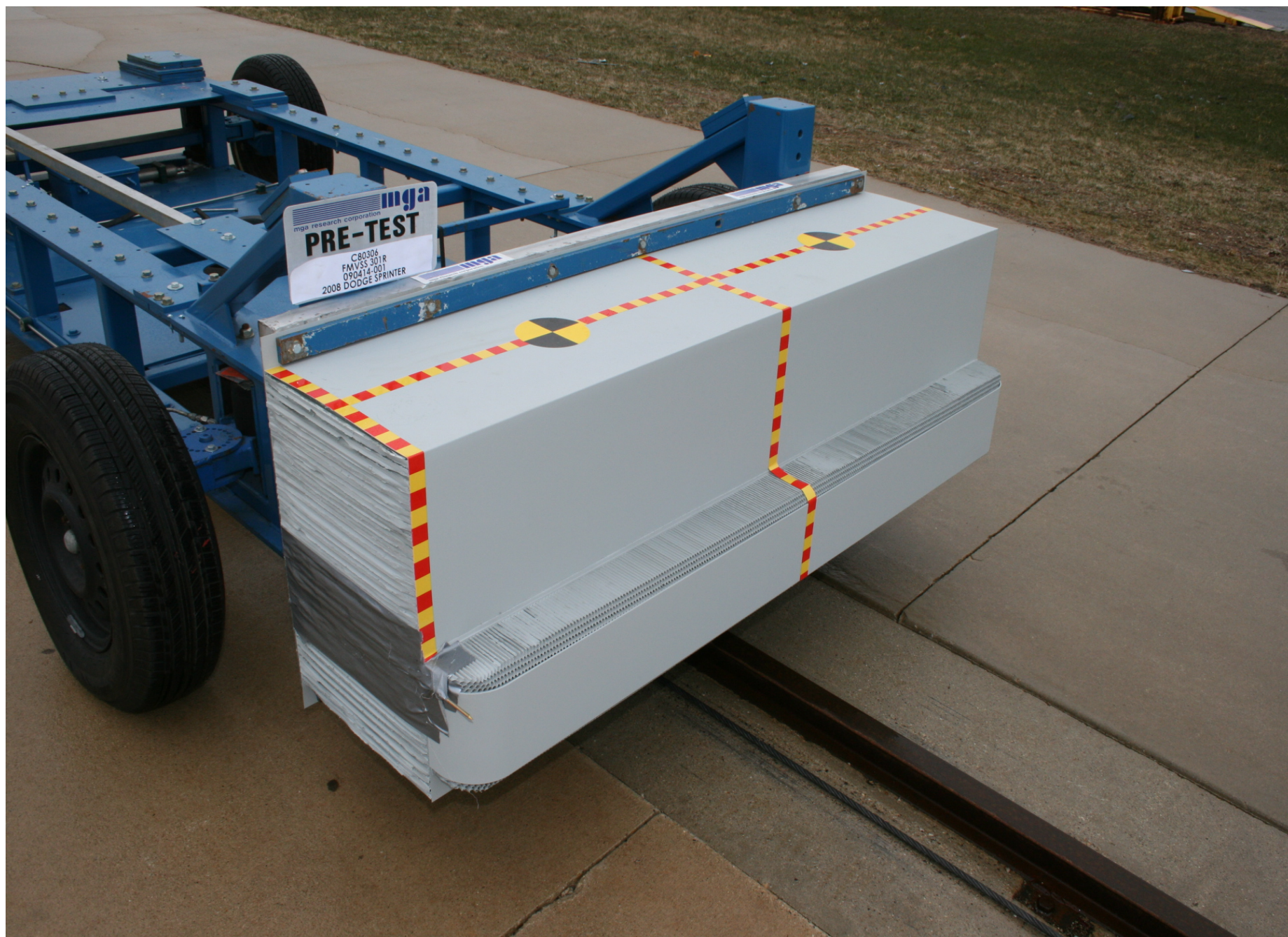
Post-Test Underbody View 4



Pre-Test Front View of MDB



Post-Test Front View of MDB



Pre-Test $\frac{3}{4}$ Right Side View of MDB



Post-Test ¾ Right Side View of MDB



Pre-Test 3/4 Left Side View of MDB



Post-Test $\frac{3}{4}$ Left Side View of MDB



Pre-Test Top View of MDB



Post-Test Top View of MDB



Static Rollover at 90 Degrees



Static Rollover at 180 Degrees

A-40.



Static Rollover at 270 Degrees

A-4.1.



Static Rollover at 360 Degrees